CLAIMS

I claim:

1. A continuous polymerization process for producing liquid hydride-functional and/or organofunctional siloxane polymer products, comprising the steps of:

(a). providing a substantially homogeneous liquid mixture of siloxane reactants;

(b). continuously introducing the siloxane reactants to a tubular reactor packed with a solid, acidic polymerization catalyst which is substantially insoluble in and substantially immobile to the siloxane reactants and the polymer products;

(c). driving the reactant mixture through the tubular reactor under substantially plug flow conditions;

(d). carrying out cationic polymerization of the siloxane reactants in the tubular reactor until reaching a substantially thermodynamic equilibrium composition of siloxane reactants and siloxane polymer products;

(e). continuously removing the substantially thermodynamic equilibrium composition from the tubular reactor; and

(f). volatilizing the siloxane reactants and any low boiling by-products from the equilibrium composition;

wherein the composition contains substantially no catalyst or by-products, such that neutralization of the catalyst or filtering of the composition is unnecessary.

2. The process according to claim 1, wherein the polymer products are selected from the group consisting of linear polymers, copolymers, terpolymers, and mixtures thereof.

3. The process according to claim 1, wherein the polymer products have a number average molecular weight in a range of about 500 to 200,000.

4. The process according to claim 1, wherein the polymerization step is carried out substantially isothermally.

5. The process according to claim 1, wherein the polymerization step is carried out at a temperature in a range of about 15 to 180°C.

6. The process according to claim 5, wherein the temperature is in a range about 20 to 90°C.

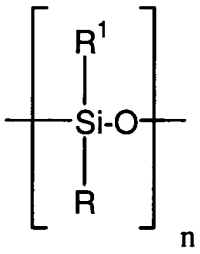
7. The process according to claim 1, wherein the reactant mixture has a residence time of about 1 to 480 minutes in the tubular reactor.

8. The process according to claim 7, wherein the residence time is about 15 to 60 minutes.

9. The process according to claim 1, wherein the tubular reactor operates at a pressure of about 5 to 600 psi.

10. The process according to claim 9, wherein the volatilized reactants and by-products are recycled to step (a).

11. The process according to claim 1, wherein the siloxane reactants comprise at least one siloxane monomer having the general formula:



where R^1 is hydrogen or an optionally substituted functional alkyl, alkyl, alkenyl, aryl, alkaryl or aralkyl group having 1 to 20 carbon atoms;

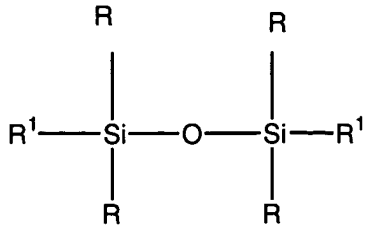
R is a substituted alkyl, aryl, alkaryl or aralkyl group having 1 to 20 carbon atoms; and

n is an integer from 3 to 1000.

12. The process according to claim 11, wherein at least one of the siloxane reactants comprises a cyclic siloxane.

13. The process according to claim 11, wherein the siloxane reactants include at least one chain terminating agent.

14. The process according to claim 13, wherein the at least one chain terminating agent has the general formula:



where R^1 is independently hydrogen or an optionally substituted functional alkyl, alkyl, alkenyl, aryl, aralkyl, or alkaryl group having 1 to 8 carbon atoms; and

R is independently a substituted alkyl, aryl, alkaryl, or aralkyl group having 1 to 8 carbon atoms.

15. The process according to claim 1, wherein the siloxane reactants comprise dimethylcyclic siloxane, methylhydrogencyclic siloxane and hexamethyldisiloxane, and the siloxane polymer product is poly-methylhydrogen siloxane-dimethylsiloxane copolymer, trimethylsiloxy terminated.

16. The process according to claim 1, wherein the siloxane reactants comprise linear polysiloxanes.

17. The process according to claim 16, wherein the reactant mixture includes a solvent for the polysiloxanes.

18. The process according to claim 1, wherein the catalyst is selected from the group consisting acid clays, mineral acid catalysts, silica-alumina, titano-silica-alumina, sulfonated ion exchange resins, acidic zeolites, and trifluoromethane sulfonated ion exchange resins.

19. The process according to claim 1, wherein step (a) is carried out by passing the siloxane reactants through a static mixer prior to entering the tubular reactor.

20. The process according to claim 1, wherein the equilibrium composition is removed from the tubular reactor through a static mixer.

21. The process according to claim 1, wherein the tubular reactor comprises two packed reactor sections.

22. A siloxane polymer product produced according to the process of claim 1 and being optically clear, homogeneous and substantially free of catalyst.

23. A trimethylsiloxy terminated poly-methylhydrogen siloxane-dimethylsiloxane copolymer produced by the process of claim 15 and being optically clear, homogeneous and substantially free of catalyst.